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#11

SEQUENCE LISTING

<110> International Flower Developments Pty Ltd

<120> Genetic sequences encoding flavonoid pathway enzymes
and uses therefor

<130> 2088133

<140> 09/142108

<141> 1997-02-28

<150> PN8386

<151> 1996-03-01

<160> 41

<170> PatentIn Ver. 2.1

<210> 1

<211> 1789

<212> DNA

<213> Petunia x hybrida

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<221> CDS

<222> (50)..(1588)

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Gln	Leu	Asn	Trp	Leu	Asp	Ile	Gln	Gly	Val	Ala	Ala	Lys	Met	Lys	Lys		
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<213> Petunia x hybrida

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Asn	Asp	Phe	Glu	Val	Ile	Pro	Phe	Gly	Ala	Gly	Arg	Arg	Ile	Cys	Ala		435		440		445	
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Met His
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Tyr Gln Asp Leu Val Phe Ala Pro Tyr Gly Pro Lys Trp Arg Met Leu
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 Tyr Asn Tyr Gln Asp Leu Val Phe Ala Pro Tyr Gly Pro Lys Trp Arg
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Val Leu Ala Asp Ala Gly Glu Thr Pro Leu Lys Leu Gly Gln Met Met	
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Val Glu Leu Met Val Leu Ala Gly Val Phe Asn Leu Gly Asp Phe Ile	
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Lys Leu His Leu Arg Phe Asp Ser Phe Leu Ser Lys Ile Leu Gly Asp	
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Asn Met Leu Ile Ser Leu Lys Asp Ala Asp Asp Ala Glu Gly Gly Arg	
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Val Arg His Pro Glu Ile Leu Ala Gln Val Gln Lys Glu Leu Asp Ser	
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Lys	Glu	Ala	Asp	Leu	Ala	Gly	Leu	Pro	Phe	Leu	Gln	Ala	Val	Val	Lys
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Met	Phe	Thr	Ala	Gly	Thr	Asp	Thr	Ser	Ala	Ser	Thr	Val	Asp	Trp	Ala	
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gaa	ctt	gat	att	gtt	gtg	ggc	cgt	gac	agg	cct	gtt	aat	gaa	tca	gac	240
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Ile	Ala	Gln	Leu	Pro	Tyr	Leu	Gln	Ala	Val	Ile	Lys	Glu	Asn	Phe	Arg	
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Ala Ser Trp Thr Arg Tyr Met Ala Cys Thr Lys Leu Thr Phe	
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Glu Leu Asp Ile Val Val Gly Arg Asp Arg Pro Val Asn Glu Ser Asp
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Ile Ala Gln Leu Pro Tyr Leu Gln Ala Val Ile Lys Glu Asn Phe Arg
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Leu His Pro Pro Thr Pro Leu Ser Leu Pro His Ile Ala Ser Glu Ser
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Cys Glu Ile Asn Gly Tyr His Ile Pro Lys Gly Ser Thr Leu Phe Asp
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Ala Phe Lys Pro Glu Arg Phe Leu Pro Gly Gly Glu Lys Ser Gly Val
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Asp Val Lys Gly Ser Asp Phe Glu Leu Ile Pro Phe Gly Ala Gly Arg
          165          170          175
Pro Ile Cys Ala Gly Leu Ser Leu Gly Leu Arg Thr Asp Leu Ser Cys
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Leu His Ala Asn Val Ala His Lys His Leu Ile Gly Asn Phe Ser Trp
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Arg Ser Tyr Ala Gly Gln Pro Glu Tyr Arg Arg Lys Ser Leu Leu Gly
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Phe Thr Leu Gln Arg Ala Val Pro Ser Val Val His Pro Lys Pro Arg
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gcc gga gta ttt aac atc gga gat ttc gtg ccg tca ctt gat tgg tta Ala Gly Val Phe Asn Ile Gly Asp Phe Val Pro Ser Leu Asp Trp Leu 65 70 75	2887
gat tta caa ggc gtc gct ggt aaa atg aaa cgg ctt cac aaa aga ttc Asp Leu Gln Gly Val Ala Gly Lys Met Lys Arg Leu His Lys Arg Phe 80 85 90 95	2935
gac gct ttt cta tcg tcg att ttg aaa gag cac gaa atg aac ggt caa Asp Ala Phe Leu Ser Ser Ile Leu Lys Glu His Glu Met Asn Gly Gln 100 105 110	2983
gat caa aag cat aca gat atg ctt agc act tta atc tcc ctt aaa gga Asp Gln Lys His Thr Asp Met Leu Ser Thr Leu Ile Ser Leu Lys Gly 115 120 125	3031
act gat ctt gac ggt gac gga gga agc tta acg gat act gag att aaa Thr Asp Leu Asp Gly Asp Gly Gly Ser Leu Thr Asp Thr Glu Ile Lys 130 135 140	3079
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Ala Leu Leu Leu
145

aatgaaagtt agattgtttt ttttggttgt aaatacag aac atg ttc aca gct 3184
Asn Met Phe Thr Ala
1 5

gga act gac acg tca gca agt acg gtg gac tgg gct ata gct gaa ctt 3232
Gly Thr Asp Thr Ser Ala Ser Thr Val Asp Trp Ala Ile Ala Glu Leu
10 15 20

atc cgt cac ccg gat ata atg gtt aaa gcc caa gaa gaa ctt gat att 3280
Ile Arg His Pro Asp Ile Met Val Lys Ala Gln Glu Glu Leu Asp Ile
25 30 35

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Val Val Gly Arg Asp Arg Pro Val Asn Glu Ser Asp Ile Ala Gln Leu
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cct tac ctt cag gtaccgttaa cccaaaccgg aatttgaat tgttttggtt 3380
Pro Tyr Leu Gln
55

agcgagctat tgttgttaat ccggttttgg tttaaaacag gcg gtt atc aaa gag 3435
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1 5

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Asn Phe Arg Leu His Pro Pro Thr Pro Leu Ser Leu Pro His Ile Ala
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Ser Glu Ser Cys Glu Ile Asn Gly Tyr His Ile Pro Lys Gly Ser Thr
25 30 35

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Leu Leu Thr Asn Ile Trp Ala Ile Ala Arg Asp Pro Asp Gln Trp Ser
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gac ccg tta gca ttt aaa ccc gag aga ttc tta ccc ggt ggt gaa aaa 3627
Asp Pro Leu Ala Phe Lys Pro Glu Arg Phe Leu Pro Gly Gly Glu Lys
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tcc ggc gtt gat gtg aaa gga agc gat ttc gag cta ata ccg ttc gga 3675
Ser Gly Val Asp Val Lys Gly Ser Asp Phe Glu Leu Ile Pro Phe Gly
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Ala Pro Asn Val Tyr Gly Leu Gly Ser Gly	
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Leu Pro Pro Gly Pro Asn Pro Trp Pro Ile Ile Gly Asn Leu Pro His
35 40 45

Met Gly Thr Lys Pro His Arg Thr Leu Ser Ala Met Val Thr Thr Tyr
50 55 60

Gly Pro Ile Leu His Leu Arg Leu Gly Phe Val Asp Val Val Val Ala
65 70 75 80

Ala Ser Lys Ser Val Ala Glu Gln Phe Leu Lys Ile His Asp Ala Asn
85 90 95

Phe Ala Ser Arg Pro Pro Asn Ser Gly Ala Lys His Met Ala Tyr Asn
100 105 110

Tyr Gln Asp Leu Val Phe Ala Pro Tyr Gly His Arg Trp Arg Leu Leu
115 120 125

Arg Lys Ile Ser Ser Val His Leu Phe Ser Ala Lys Ala Leu Glu Asp
130 135 140

Phe Lys His Val Arg Gln
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35 40 45

Lys Ala Asp Glu Phe Arg Ser Met Val Thr Glu Met Met Ala Leu Ala
50 55 60

Gly Val Phe Asn Ile Gly Asp Phe Val Pro Ser Leu Asp Trp Leu Asp
65 70 75 80

Leu Gln Gly Val Ala Gly Lys Met Lys Arg Leu His Lys Arg Phe Asp
85 90 95

Ala Phe Leu Ser Ser Ile Leu Lys Glu His Glu Met Asn Gly Gln Asp
100 105 110

Gln Lys His Thr Asp Met Leu Ser Thr Leu Ile Ser Leu Lys Gly Thr
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Leu Leu Leu
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Asp Ile Ala Gln Leu Pro Tyr Leu Gln
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20 25 30

Pro Lys Gly Ser Thr Leu Leu Thr Asn Ile Trp Ala Ile Ala Arg Asp
35 40 45

Pro Asp Gln Trp Ser Asp Pro Leu Ala Phe Lys Pro Glu Arg Phe Leu
50 55 60

Pro Gly Gly Glu Lys Ser Gly Val Asp Val Lys Gly Ser Asp Phe Glu
65 70 75 80

Leu Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys Ala Gly Leu Ser Leu
85 90 95

Gly Leu Arg Thr Ile Gln Phe Leu Thr Ala Thr Leu Val Gln Gly Phe
100 105 110

Asp Trp Glu Leu Ala Gly Gly Val Thr Pro Glu Lys Leu Asn Met Glu
115 120 125

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Phe Ala Val Phe Leu Phe Arg Leu Leu Phe Ser Gly Lys Ser Gln Arg
15 20 25

cac tcg ctc cct ctc cct cct ggc ccc aaa cca tgg ccg gtg gtt ggc 147
His Ser Leu Pro Leu Pro Pro Gly Pro Lys Pro Trp Pro Val Val Gly
30 35 40

aac tta cct cac ttg ggc ccc ttc ccg cac cac tcc atc gcg gag ttg 195
Asn Leu Pro His Leu Gly Pro Phe Pro His His Ser Ile Ala Glu Leu
45 50 55

gcg aag aaa cac ggg ccg ctc atg cac ctc cgc ctc ggc tac gtt gac 243
Ala Lys Lys His Gly Pro Leu Met His Leu Arg Leu Gly Tyr Val Asp
60 65 70

gta gtc gtg gcg gca tca gca tcc gta gcg gcc cag ttc ttg aag act 291

Val	Val	Val	Ala	Ala	Ser	Ala	Ser	Val	Ala	Ala	Gln	Phe	Leu	Lys	Thr	
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cac	gac	gcc	aat	ttc	tcc	agc	cga	ccg	ccc	aac	tcc	ggc	gcc	aag	cac	339
His	Asp	Ala	Asn	Phe	Ser	Ser	Arg	Pro	Pro	Asn	Ser	Gly	Ala	Lys	His	
			95					100					105			
ctc	gcc	tat	aac	tac	cag	gac	ctc	gtg	ttc	agg	ccg	tac	ggc	cca	cgg	387
Leu	Ala	Tyr	Asn	Tyr	Gln	Asp	Leu	Val	Phe	Arg	Pro	Tyr	Gly	Pro	Arg	
			110				115					120				
tgg	cgc	atg	ttc	cgg	aag	atc	agc	tcc	gtc	cat	ctg	ttc	tcc	ggc	aaa	435
Trp	Arg	Met	Phe	Arg	Lys	Ile	Ser	Ser	Val	His	Leu	Phe	Ser	Gly	Lys	
		125				130					135					
gcc	ttg	gat	gat	ctt	aaa	cac	gtc	cgg	cag	gag	gag	gta	agt	gtg	cta	483
Ala	Leu	Asp	Asp	Leu	Lys	His	Val	Arg	Gln	Glu	Glu	Val	Ser	Val	Leu	
	140					145				150						
gcg	cat	gcc	ttg	gca	aat	tca	ggg	tca	aag	gta	gtg	aac	ctg	gcg	caa	531
Ala	His	Ala	Leu	Ala	Asn	Ser	Gly	Ser	Lys	Val	Val	Asn	Leu	Ala	Gln	
155					160				165					170		
ctg	ctg	aac	ctg	tgc	acg	gtc	aat	gct	cta	gga	agg	gtg	atg	gta	ggg	579
Leu	Leu	Asn	Leu	Cys	Thr	Val	Asn	Ala	Leu	Gly	Arg	Val	Met	Val	Gly	
			175					180					185			
cgg	agg	gtt	ttc	ggc	gac	ggc	agc	gga	ggc	gac	gat	ccg	aag	gcg	gac	627
Arg	Arg	Val	Phe	Gly	Asp	Gly	Ser	Gly	Gly	Asp	Asp	Pro	Lys	Ala	Asp	
		190						195				200				
gag	ttc	aaa	tcg	atg	gtg	gtg	gag	atg	atg	gtg	ttg	gca	gga	gtg	ttc	675
Glu	Phe	Lys	Ser	Met	Val	Val	Glu	Met	Met	Val	Leu	Ala	Gly	Val	Phe	
		205					210				215					
aac	ata	ggt	gac	ttc	atc	ccc	tct	ctc	gaa	tgg	ctt	gac	ttg	caa	ggc	723
Asn	Ile	Gly	Asp	Phe	Ile	Pro	Ser	Leu	Glu	Trp	Leu	Asp	Leu	Gln	Gly	
	220					225				230						
gtg	gcg	tcc	aag	atg	aag	aag	ctc	cac	aag	aga	ttc	gac	gac	ttc	ttg	771
Val	Ala	Ser	Lys	Met	Lys	Lys	Leu	His	Lys	Arg	Phe	Asp	Asp	Phe	Leu	
235					240				245					250		
aca	gcc	att	gtc	gag	gac	cac	aag	aag	ggc	tcc	ggc	acg	gcg	ggg	cac	819
Thr	Ala	Ile	Val	Glu	Asp	His	Lys	Lys	Gly	Ser	Gly	Thr	Ala	Gly	His	
			255						260					265		
gtc	gac	atg	ttg	acc	act	ctg	ctc	tcg	ctc	aag	gaa	gac	gcc	gac	ggc	867
Val	Asp	Met	Leu	Thr	Thr	Leu	Leu	Ser	Leu	Lys	Glu	Asp	Ala	Asp	Gly	
			270					275					280			
gaa	gga	ggc	aag	ctc	acc	gat	act	gaa	atc	aaa	gct	ttg	ctt	ttg	aac	915
Glu	Gly	Gly	Lys	Leu	Thr	Asp	Thr	Glu	Ile	Lys	Ala	Leu	Leu	Leu	Asn	
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ata gct gaa ctc att cgg cac cct cat atg cta gcg cga gtt cag aaa	1011
Ile Ala Glu Leu Ile Arg His Pro His Met Leu Ala Arg Val Gln Lys	
315 320 325 330	
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Glu Leu Asp Asp Phe Val Gly His Asp Arg Leu Val Thr Glu Ser Asp	
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Ile Pro Asn Leu Pro Tyr Leu Gln Ala Val Ile Lys Glu Thr Phe Arg	
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Leu His Pro Ser Thr Pro Leu Ser Leu Pro Arg Met Ala Ala Glu Ser	
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Cys Glu Ile Asn Gly Tyr His Ile Pro Lys Gly Ser Thr Leu Leu Val	
380 385 390	
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Asn Val Trp Ala Ile Ser Arg Asp Pro Ala Glu Trp Ala Asp Pro Leu	
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Glu Phe Lys Pro Glu Arg Phe Leu Pro Gly Gly Glu Lys Pro Asn Val	
415 420 425	
gat att aga gga aac gat ttt gaa gtc ata ccc ttc ggt gcc ggg cga	1347
Asp Ile Arg Gly Asn Asp Phe Glu Val Ile Pro Phe Gly Ala Gly Arg	
430 435 440	
aga ata tgt gcc ggg atg agc ttg ggc ctg cgt atg gtc cat tta atg	1395
Arg Ile Cys Ala Gly Met Ser Leu Gly Leu Arg Met Val His Leu Met	
445 450 455	
act gca aca ttg gtc cac gca ttt aat tgg gcc ttg gct gat ggg ctg	1443
Thr Ala Thr Leu Val His Ala Phe Asn Trp Ala Leu Ala Asp Gly Leu	
460 465 470	
acc gct gag aag tta aac atg gat gaa gca tat ggg ctc act cta caa	1491
Thr Ala Glu Lys Leu Asn Met Asp Glu Ala Tyr Gly Leu Thr Leu Gln	
475 480 485 490	
cga gct gca ccg tta atg gtg cac ccg cgc acc agg ctg gcc cca cag	1539
Arg Ala Ala Pro Leu Met Val His Pro Arg Thr Arg Leu Ala Pro Gln	
495 500 505	
gca tat aaa act tca tca tct taa ttagagagct atgttctggg tgtgcccggt	1593

Ala Tyr Lys Thr Ser Ser Ser
510

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aatcacaaaa gttgctatct aaattccatg tccaatgaaa acgttcttct tcccttctta 1713

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Arg	Leu	Leu	Phe	Ser	Gly	Lys	Ser	Gln	Arg	His	Ser	Leu	Pro	Leu	Pro	20	25	30	
Pro	Gly	Pro	Lys	Pro	Trp	Pro	Val	Val	Gly	Asn	Leu	Pro	His	Leu	Gly	35	40	45	
Pro	Phe	Pro	His	His	Ser	Ile	Ala	Glu	Leu	Ala	Lys	Lys	His	Gly	Pro	50	55	60	
Leu	Met	His	Leu	Arg	Leu	Gly	Tyr	Val	Asp	Val	Val	Val	Ala	Ala	Ser	65	70	75	80
Ala	Ser	Val	Ala	Ala	Gln	Phe	Leu	Lys	Thr	His	Asp	Ala	Asn	Phe	Ser	85	90	95	
Ser	Arg	Pro	Pro	Asn	Ser	Gly	Ala	Lys	His	Leu	Ala	Tyr	Asn	Tyr	Gln	100	105	110	
Asp	Leu	Val	Phe	Arg	Pro	Tyr	Gly	Pro	Arg	Trp	Arg	Met	Phe	Arg	Lys	115	120	125	
Ile	Ser	Ser	Val	His	Leu	Phe	Ser	Gly	Lys	Ala	Leu	Asp	Asp	Leu	Lys	130	135	140	
His	Val	Arg	Gln	Glu	Glu	Val	Ser	Val	Leu	Ala	His	Ala	Leu	Ala	Asn	145	150	155	160
Ser	Gly	Ser	Lys	Val	Val	Asn	Leu	Ala	Gln	Leu	Leu	Asn	Leu	Cys	Thr	165	170	175	
Val	Asn	Ala	Leu	Gly	Arg	Val	Met	Val	Gly	Arg	Arg	Val	Phe	Gly	Asp	180	185	190	
Gly	Ser	Gly	Gly	Asp	Asp	Pro	Lys	Ala	Asp	Glu	Phe	Lys	Ser	Met	Val	195	200	205	
Val	Glu	Met	Met	Val	Leu	Ala	Gly	Val	Phe	Asn	Ile	Gly	Asp	Phe	Ile	210	215	220	
Pro	Ser	Leu	Glu	Trp	Leu	Asp	Leu	Gln	Gly	Val	Ala	Ser	Lys	Met	Lys	225	230	235	240
Lys	Leu	His	Lys	Arg	Phe	Asp	Asp	Phe	Leu	Thr	Ala	Ile	Val	Glu	Asp	245	250	255	
His	Lys	Lys	Gly	Ser	Gly	Thr	Ala	Gly	His	Val	Asp	Met	Leu	Thr	Thr	260	265	270	
Leu	Leu	Ser	Leu	Lys	Glu	Asp	Ala	Asp	Gly	Glu	Gly	Gly	Lys	Leu	Thr	275	280	285	

Asp Thr Glu Ile Lys Ala Leu Leu Leu Asn Met Phe Thr Ala Gly Thr
 290 295 300
 Asp Thr Ser Ser Ser Thr Val Glu Trp Ala Ile Ala Glu Leu Ile Arg
 305 310 315 320
 His Pro His Met Leu Ala Arg Val Gln Lys Glu Leu Asp Asp Phe Val
 325 330 335
 Gly His Asp Arg Leu Val Thr Glu Ser Asp Ile Pro Asn Leu Pro Tyr
 340 345 350
 Leu Gln Ala Val Ile Lys Glu Thr Phe Arg Leu His Pro Ser Thr Pro
 355 360 365
 Leu Ser Leu Pro Arg Met Ala Ala Glu Ser Cys Glu Ile Asn Gly Tyr
 370 375 380
 His Ile Pro Lys Gly Ser Thr Leu Leu Val Asn Val Trp Ala Ile Ser
 385 390 395 400
 Arg Asp Pro Ala Glu Trp Ala Asp Pro Leu Glu Phe Lys Pro Glu Arg
 405 410 415
 Phe Leu Pro Gly Gly Glu Lys Pro Asn Val Asp Ile Arg Gly Asn Asp
 420 425 430
 Phe Glu Val Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys Ala Gly Met
 435 440 445
 Ser Leu Gly Leu Arg Met Val His Leu Met Thr Ala Thr Leu Val His
 450 455 460
 Ala Phe Asn Trp Ala Leu Ala Asp Gly Leu Thr Ala Glu Lys Leu Asn
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 Ser

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 Val Leu Tyr Val Phe Leu Asn Leu Ser Ser Arg Lys Ser Ala Arg Leu
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 cca ccc ggg cca aca cca tgg cct ata gtc ggg aac tta cca cac ctt 144
 Pro Pro Gly Pro Thr Pro Trp Pro Ile Val Gly Asn Leu Pro His Leu
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Gly Pro Ile Pro His His Ala Leu Ala Ala Leu Ala Lys Lys Tyr Gly	
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Pro Leu Met His Leu Arg Leu Gly Cys Val Asp Val Val Val Ala Ala	
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Ser Ala Ser Val Ala Ala Gln Phe Leu Lys Val His Asp Ala Asn Phe	
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gct agt agg ccg cca aat tct ggc gcg aaa cat gtg gcg tat aat tat	336
Ala Ser Arg Pro Pro Asn Ser Gly Ala Lys His Val Ala Tyr Asn Tyr	
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Gln Asp Leu Val Phe Ala Pro Tyr Gly Pro Arg Trp Arg Leu Leu Arg	
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Lys Ile Cys Ser Val His Leu Phe Ser Ala Lys Ala Leu Asp Asp Phe	
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Arg His Val Arg Gln Glu Glu Val Ala Val Leu Thr Arg Val Leu Leu	
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Ser Ala Gly Asn Ser Pro Val Gln Leu Gly Gln Leu Leu Asn Val Cys	
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Ala Thr Asn Ala Leu Ala Arg Val Met Leu Gly Arg Arg Val Phe Gly	
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gac gga att gac agg tca gcc aat gag ttc aaa gat atg gta gta gag	624
Asp Gly Ile Asp Arg Ser Ala Asn Glu Phe Lys Asp Met Val Val Glu	
195 200 205	
tta atg gta tta gca gga gaa ttt aac ctt ggt gac ttt att cct gta	672
Leu Met Val Leu Ala Gly Glu Phe Asn Leu Gly Asp Phe Ile Pro Val	
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Leu Asp Leu Phe Asp Leu Gln Gly Ile Thr Lys Lys Met Lys Lys Leu	
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His Val Arg Phe Asp Ser Phe Leu Ser Lys Ile Val Glu Glu His Lys	
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Ser	Leu	Lys	Asp	Asp	Ala	Asp	Ile	Glu	Gly	Gly	Lys	Leu	Thr	Asp	Thr	
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Glu	Ile	Lys	Ala	Leu	Leu	Leu	Asn	Leu	Phe	Ala	Ala	Gly	Thr	Asp	Thr	
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Ser	Ser	Ser	Thr	Val	Glu	Trp	Ala	Ile	Ala	Glu	Leu	Ile	Arg	His	Pro	
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Gln	Ile	Leu	Lys	Gln	Ala	Arg	Glu	Glu	Ile	Asp	Ala	Val	Val	Gly	Gln	
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Asp	Arg	Leu	Val	Thr	Glu	Leu	Asp	Leu	Ser	Gln	Leu	Thr	Tyr	Leu	Gln	
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Ala	Leu	Val	Lys	Glu	Val	Phe	Arg	Leu	His	Pro	Ser	Thr	Pro	Leu	Ser	
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Leu	Pro	Arg	Ile	Ser	Ser	Glu	Ser	Cys	Glu	Val	Asp	Gly	Tyr	Tyr	Ile	
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Pro	Lys	Gly	Ser	Thr	Leu	Leu	Val	Asn	Val	Trp	Ala	Ile	Ala	Arg	Asp	
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Pro	Lys	Met	Trp	Ala	Asp	Pro	Leu	Glu	Phe	Arg	Pro	Ser	Arg	Phe	Leu	
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Pro	Gly	Gly	Glu	Lys	Pro	Gly	Ala	Asp	Val	Arg	Gly	Asn	Asp	Phe	Glu	
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Val	Ile	Pro	Phe	Gly	Ala	Gly	Arg	Arg	Ile	Cys	Ala	Gly	Met	Ser	Leu	
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Gly	Leu	Arg	Met	Val	Gln	Leu	Leu	Ile	Ala	Thr	Leu	Val	Gln	Thr	Phe	
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Asp	Trp	Glu	Leu	Ala	Asn	Gly	Leu	Glu	Pro	Glu	Met	Leu	Asn	Met	Glu	
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 Ser Ser Thr Val Glu Trp Ala Ile Ala Glu Leu Ile Arg His Pro Gln
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 Lys Gly Ser Thr Leu Leu Val Asn Val Trp Ala Ile Ala Arg Asp Pro
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 Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys Ala Gly Met Ser Leu Gly
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 Met Ser Pro
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Ser Leu Arg Leu Leu Leu Phe Ser Gly Gln Gly Arg Arg Leu Leu Pro	
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Pro Gly Pro Arg Pro Trp Pro Leu Val Gly Asn Leu Pro His Leu Gly	
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Pro Lys Pro His Ala Ser Met Ala Glu Leu Ala Arg Ala Tyr Gly Pro	
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Ser Arg Pro Pro Asn Ser Gly Ala Lys His Val Ala Tyr Asn Tyr Glu	
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Asp Leu Val Phe Arg Pro Tyr Gly Pro Lys Trp Arg Leu Leu Arg Lys	
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Ile Cys Ala Gln His Ile Phe Ser Val Lys Ala Met Asp Asp Phe Arg	
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Arg Val Arg Glu Glu Glu Val Ala Ile Leu Ser Arg Ala Leu Ala Gly	
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Lys Arg Ala Val Pro Ile Gly Gln Met Leu Asn Val Cys Ala Thr Asn	
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Ala Leu Ser Arg Val Met Met Gly Arg Arg Val Val Gly His Ala Asp	
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Gly Thr Asn Asp Ala Lys Ala Glu Glu Phe Lys Ala Met Val Val Glu	
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Leu Met Val Leu Ser Gly Val Phe Asn Ile Gly Asp Phe Ile Pro Phe	
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His	Ala	Arg	Phe	Asp	Ala	Phe	Leu	Thr	Glu	Ile	Val	Arg	Glu	Arg	Cys		
	245					250				255							
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His	Gly	Gln	Ile	Asn	Asn	Ser	Gly	Ala	His	Gln	Asp	Asp	Leu	Leu	Ser		
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Thr	Leu	Ile	Ser	Phe	Lys	Gly	Leu	Asp	Asp	Gly	Asp	Gly	Ser	Arg	Leu		
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act	gac	aca	gaa	atc	aag	gcg	ctg	ctc	ttg	aac	ctt	ttg	gac	acg	acg	1027	
Thr	Asp	Thr	Glu	Ile	Lys	Ala	Leu	Leu	Leu	Asn	Leu	Leu	Asp	Thr	Thr		
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Thr	Leu	Ala	Gln	Val	Arg	Gln	Glu	Leu	Asp	Ser	Val	Val	Gly	Lys	Asn		
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Arg	Leu	Val	Ser	Glu	Thr	Asp	Leu	Asn	Gln	Leu	Pro	Tyr	Leu	Gln	Ala		
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Val	Val	Lys	Glu	Thr	Phe	Arg	Leu	His	Pro	Pro	Thr	Pro	Leu	Ser	Leu		
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Pro	Arg	Leu	Ala	Glu	Asp	Asp	Cys	Glu	Ile	Asp	Gly	Tyr	Leu	Ile	Pro		
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Lys	Gly	Ser	Thr	Leu	Leu	Val	Asn	Val	Trp	Ala	Ile	Ala	Arg	Asp	Pro		
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Lys	Val	Trp	Ala	Asp	Pro	Leu	Glu	Phe	Arg	Pro	Glu	Arg	Phe	Leu	Thr		
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Gly	Gly	Glu	Lys	Ala	Asp	Val	Asp	Val	Lys	Gly	Asn	Asp	Phe	Glu	Val		
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Ile	Pro	Phe	Gly	Ala	Gly	Arg	Arg	Ile	Cys	Ala	Gly	Val	Gly	Leu	Gly		
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 Ile Arg Met Val Gln Leu Leu Thr Ala Ser Leu Ile His Ala Phe Asp
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 Leu Asp Leu Ala Asn Gly Leu Leu Ala Gln Asn Leu Asn Met Glu Glu
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 gca tat ggg ctt acg cta caa cgg gct gag cct ttg ttg gtc cac cct 1603
 Ala Tyr Gly Leu Thr Leu Gln Arg Ala Glu Pro Leu Leu Val His Pro
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 agg ccg cgg ttg gcc act cat gtc tat taa ttaaattagg cctaaactac 1653
 Arg Pro Arg Leu Ala Thr His Val Tyr
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 His Leu Gly Pro Lys Pro His Ala Ser Met Ala Glu Leu Ala Arg Ala
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 Tyr Gly Pro Leu Met His Leu Lys Met Gly Phe Val His Val Val Val
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 Asn Phe Leu Ser Arg Pro Pro Asn Ser Gly Ala Lys His Val Ala Tyr
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 Asn Tyr Glu Asp Leu Val Phe Arg Pro Tyr Gly Pro Lys Trp Arg Leu
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Phe	Leu	Ile	Leu	Arg	Val	Lys	Gln	Arg	Tyr	Pro	Leu	Pro	Leu	Pro	Pro	
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Gly	Pro	Lys	Pro	Trp	Pro	Val	Leu	Gly	Asn	Leu	Pro	His	Leu	Gly	Lys	
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Lys	Pro	His	Gln	Ser	Ile	Ala	Ala	Met	Ala	Glu	Arg	Tyr	Gly	Pro	Leu	
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Met	His	Leu	Arg	Leu	Gly	Phe	Val	Asp	Val	Val	Val	Ala	Ala	Ser	Ala	
	65				70				75					80		
gcc	gtg	gcc	gct	cag	ttc	ttg	aaa	gtt	cac	gac	tcg	aac	ttc	tcc	aac	289
Ala	Val	Ala	Ala	Gln	Phe	Leu	Lys	Val	His	Asp	Ser	Asn	Phe	Ser	Asn	
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cgg	ccg	ccg	aac	tcc	ggc	gcg	gaa	cac	att	gct	tat	aac	tat	caa	gac	337
Arg	Pro	Pro	Asn	Ser	Gly	Ala	Glu	His	Ile	Ala	Tyr	Asn	Tyr	Gln	Asp	
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ctc	gtc	ttc	gcg	ccc	tac	ggc	ccg	cgg	tgg	cgc	atg	ctt	agg	aag	atc	385
Leu	Val	Phe	Ala	Pro	Tyr	Gly	Pro	Arg	Trp	Arg	Met	Leu	Arg	Lys	Ile	
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acc	tcc	gtg	cat	ctc	ttc	tcg	gcc	aag	gcg	ttg	gat	gac	ttc	tgc	cat	433
Thr	Ser	Val	His	Leu	Phe	Ser	Ala	Lys	Ala	Leu	Asp	Asp	Phe	Cys	His	
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Val	Arg	Gln	Glu	Glu	Val	Ala	Thr	Leu	Thr	Arg	Ser	Leu	Ala	Ser	Ala	
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Asn	Ala	Leu	Ala	Arg	Val	Met	Leu	Gly	Arg	Lys	Val	Phe	Asn	Asp	Gly	
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Glu	Met	Met	Val	Leu	Ala	Gly	Ser	Phe	Asn	Ile	Gly	Asp	Phe	Ile	Pro	
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Leu His Pro Ser Thr Pro Leu Ser Leu Pro Arg Met Gly Ala Gln Gly	
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tgc gag atc aat ggc tac ttc atc ccc aaa ggc gca acg ctt ttg gtc	1201
Cys Glu Ile Asn Gly Tyr Phe Ile Pro Lys Gly Ala Thr Leu Leu Val	
385 390 395 400	
aac gtt tgg gcc ata gct cgt gat ccc aat gtg tgg aca aat cct ctt	1249
Asn Val Trp Ala Ile Ala Arg Asp Pro Asn Val Trp Thr Asn Pro Leu	
405 410 415	
gag ttc aac cca cac cga ttc ttg cct ggt gga gaa aag ccc aac gtg	1297
Glu Phe Asn Pro His Arg Phe Leu Pro Gly Gly Glu Lys Pro Asn Val	
420 425 430	
gat att aaa ggg aat gac ttt gaa gtg att cct ttt gga gcc ggg cgt	1345

Asp Ile Lys Gly Asn Asp Phe Glu Val Ile Pro Phe Gly Ala Gly Arg
 435 440 445
 aga ata tgc tct ggg atg agt ttg ggg ata agg atg gtt cac ctg ttg 1393
 Arg Ile Cys Ser Gly Met Ser Leu Gly Ile Arg Met Val His Leu Leu
 450 455 460
 gtt gca act ttg gtg cat gct ttt gat tgg gat ttg gtg aat gga caa 1441
 Val Ala Thr Leu Val His Ala Phe Asp Trp Asp Leu Val Asn Gly Gln
 465 470 475 480
 tct gta gag acg ctc aat atg gag gaa gct tat ggt ctc acc ctt caa 1489
 Ser Val Glu Thr Leu Asn Met Glu Glu Ala Tyr Gly Leu Thr Leu Gln
 485 490 495
 cga gct gtt cct ttg atg ttg cat cca aag ccc aga tta caa cca cat 1537
 Arg Ala Val Pro Leu Met Leu His Pro Lys Pro Arg Leu Gln Pro His
 500 505 510
 ctc tat act ctc aat taa attgcaattt gattttggtg attataacaat 1585
 Leu Tyr Thr Leu Asn
 515
 tataatcgag ggacatagga tccccattta tttatattca gttataagag acttccaaca 1645
 aaggtctagc tttcgacctt aaaagttgta aaagaggtcc tacatatgta aaagcccgcc 1705
 aaaggaaaac tggttgattt caattccgct aggccttgct cgaaagacct catgaagact 1765
 acaaagggtca tatataatgg taaaccaggt gtatttggtg taataaaaaa aaaaaaaa 1824

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 <211> 517
 <212> PRT
 <213> Jap. Morning Glory

<400> 21
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 Gly Pro Lys Pro Trp Pro Val Leu Gly Asn Leu Pro His Leu Gly Lys
 35 40 45
 Lys Pro His Gln Ser Ile Ala Ala Met Ala Glu Arg Tyr Gly Pro Leu
 50 55 60
 Met His Leu Arg Leu Gly Phe Val Asp Val Val Val Ala Ala Ser Ala
 65 70 75 80
 Ala Val Ala Ala Gln Phe Leu Lys Val His Asp Ser Asn Phe Ser Asn
 85 90 95
 Arg Pro Pro Asn Ser Gly Ala Glu His Ile Ala Tyr Asn Tyr Gln Asp
 100 105 110
 Leu Val Phe Ala Pro Tyr Gly Pro Arg Trp Arg Met Leu Arg Lys Ile
 115 120 125

Thr	Ser	Val	His	Leu	Phe	Ser	Ala	Lys	Ala	Leu	Asp	Asp	Phe	Cys	His
130						135					140				
Val	Arg	Gln	Glu	Glu	Val	Ala	Thr	Leu	Thr	Arg	Ser	Leu	Ala	Ser	Ala
145					150					155					160
Gly	Lys	Thr	Pro	Val	Lys	Leu	Gly	Gln	Leu	Leu	Asn	Val	Cys	Thr	Thr
				165					170					175	
Asn	Ala	Leu	Ala	Arg	Val	Met	Leu	Gly	Arg	Lys	Val	Phe	Asn	Asp	Gly
			180					185					190		
Gly	Ser	Lys	Ser	Asp	Pro	Lys	Ala	Glu	Glu	Phe	Lys	Ser	Met	Val	Glu
		195					200					205			
Glu	Met	Met	Val	Leu	Ala	Gly	Ser	Phe	Asn	Ile	Gly	Asp	Phe	Ile	Pro
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Val	Leu	Gly	Trp	Phe	Asp	Val	Gln	Gly	Ile	Val	Gly	Lys	Met	Lys	Lys
225					230					235					240
Leu	His	Ala	Arg	Phe	Asp	Ala	Phe	Leu	Asn	Thr	Ile	Leu	Glu	Glu	His
				245					250					255	
Lys	Cys	Val	Asn	Asn	Gln	His	Thr	Thr	Leu	Ser	Lys	Asp	Val	Asp	Phe
			260				265						270		
Leu	Ser	Thr	Leu	Ile	Arg	Leu	Lys	Asp	Asn	Gly	Ala	Asp	Met	Asp	Cys
		275					280					285			
Glu	Glu	Gly	Lys	Leu	Thr	Asp	Thr	Glu	Ile	Lys	Ala	Leu	Leu	Leu	Asn
	290					295					300				
Leu	Phe	Thr	Ala	Gly	Thr	Asp	Thr	Ser	Ser	Ser	Thr	Val	Glu	Trp	Ala
305					310					315					320
Ile	Ala	Glu	Leu	Leu	Arg	Asn	Pro	Lys	Ile	Leu	Asn	Gln	Ala	Gln	Gln
				325					330					335	
Glu	Leu	Asp	Leu	Val	Val	Gly	Gln	Asn	Gln	Leu	Val	Thr	Glu	Ser	Asp
		340						345					350		
Leu	Thr	Asp	Leu	Pro	Phe	Leu	Gln	Ala	Ile	Val	Lys	Glu	Thr	Phe	Arg
		355					360					365			
Leu	His	Pro	Ser	Thr	Pro	Leu	Ser	Leu	Pro	Arg	Met	Gly	Ala	Gln	Gly
	370					375					380				
Cys	Glu	Ile	Asn	Gly	Tyr	Phe	Ile	Pro	Lys	Gly	Ala	Thr	Leu	Leu	Val
385				390						395					400
Asn	Val	Trp	Ala	Ile	Ala	Arg	Asp	Pro	Asn	Val	Trp	Thr	Asn	Pro	Leu
			405						410					415	
Glu	Phe	Asn	Pro	His	Arg	Phe	Leu	Pro	Gly	Gly	Glu	Lys	Pro	Asn	Val
		420						425					430		
Asp	Ile	Lys	Gly	Asn	Asp	Phe	Glu	Val	Ile	Pro	Phe	Gly	Ala	Gly	Arg
	435						440					445			
Arg	Ile	Cys	Ser	Gly	Met	Ser	Leu	Gly	Ile	Arg	Met	Val	His	Leu	Leu
	450					455					460				
Val	Ala	Thr	Leu	Val	His	Ala	Phe	Asp	Trp	Asp	Leu	Val	Asn	Gly	Gln
465					470					475					480
Ser	Val	Glu	Thr	Leu	Asn	Met	Glu	Glu	Ala	Tyr	Gly	Leu	Thr	Leu	Gln
			485						490					495	
Arg	Ala	Val	Pro	Leu	Met	Leu	His	Pro	Lys	Pro	Arg	Leu	Gln	Pro	His
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<211> 1667
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<220>
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<400> 22

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ctc gcg gaa atg gcg aaa acc tac ggt ccg ctc atg cac ttg aag ttc	96
Leu Ala Glu Met Ala Lys Thr Tyr Gly Pro Leu Met His Leu Lys Phe	
20 25 30	
ggg ctt aag gac gcg gtg gtg gcg tcg tct gcg tcg gtg gca gag cag	144
Gly Leu Lys Asp Ala Val Val Ala Ser Ser Ala Ser Val Ala Glu Gln	
35 40 45	
ttt ctg aag aaa cac gac gtg aat ttc tcg aac ccg ccg cca aac tcc	192
Phe Leu Lys Lys His Asp Val Asn Phe Ser Asn Arg Pro Pro Asn Ser	
50 55 60	
ggg gcc aaa cat ata gct tat aac tat cag gac ctg gta ttc gct ccc	240
Gly Ala Lys His Ile Ala Tyr Asn Tyr Gln Asp Leu Val Phe Ala Pro	
65 70 75 80	
tat gga ccc ccg tgg ccg ttg ctt agg aaa atc tgt tcc gtc cat ctt	288
Tyr Gly Pro Arg Trp Arg Leu Leu Arg Lys Ile Cys Ser Val His Leu	
85 90 95	
ttc tcg tct aag gcc ttg gat gac ttt cag cat gtt cga cat gag gag	336
Phe Ser Ser Lys Ala Leu Asp Asp Phe Gln His Val Arg His Glu Glu	
100 105 110	
ata tgc atc ctt ata cga gca ata gcg agt ggc ggt cat gct ccg gtg	384
Ile Cys Ile Leu Ile Arg Ala Ile Ala Ser Gly Gly His Ala Pro Val	
115 120 125	
aat tta ggc aag tta tta gga gtg tgc aca acc aat gcc ctg gca aga	432
Asn Leu Gly Lys Leu Leu Gly Val Cys Thr Thr Asn Ala Leu Ala Arg	
130 135 140	
gtg atg ctt gga aga aga gta ttc gaa ggc gac ggc ggc gag aat ccg	480
Val Met Leu Gly Arg Arg Val Phe Glu Gly Asp Gly Gly Glu Asn Pro	
145 150 155 160	
cat gcc gac gag ttt aaa tca atg gtg gtg gag att atg gtg tta gcc	528
His Ala Asp Glu Phe Lys Ser Met Val Val Glu Ile Met Val Leu Ala	
165 170 175	
ggg gca ttc aac ttg ggt gat ttc atc ccg gtt cta gat tgg ttc gat	576

Gly	Ala	Phe	Asn	Leu	Gly	Asp	Phe	Ile	Pro	Val	Leu	Asp	Trp	Phe	Asp		
			180					185					190				
ttg	caa	gga	att	gct	ggt	aaa	atg	aag	aaa	ctt	cat	gcc	cgt	ttc	gac	624	
Leu	Gln	Gly	Ile	Ala	Gly	Lys	Met	Lys	Lys	Leu	His	Ala	Arg	Phe	Asp		
			195				200					205					
aag	ttt	tta	aat	ggg	atc	cta	gaa	gat	cgt	aaa	tct	aac	ggc	tct	aat	672	
Lys	Phe	Leu	Asn	Gly	Ile	Leu	Glu	Asp	Arg	Lys	Ser	Asn	Gly	Ser	Asn		
			210				215					220					
gga	gct	gaa	caa	tac	gtg	gac	ttg	ctc	agt	gtg	ttg	atc	tct	ctt	caa	720	
Gly	Ala	Glu	Gln	Tyr	Val	Asp	Leu	Leu	Ser	Val	Leu	Ile	Ser	Leu	Gln		
						230				235					240		
gat	agt	aat	atc	gac	ggt	ggt	gac	gaa	gga	acc	aaa	ctc	aca	gat	act	768	
Asp	Ser	Asn	Ile	Asp	Gly	Gly	Asp	Glu	Gly	Thr	Lys	Leu	Thr	Asp	Thr		
				245					250					255			
gaa	atc	aaa	gct	ctc	ctt	ttg	aac	ttg	ttc	ata	gcc	gga	aca	gac	act	816	
Glu	Ile	Lys	Ala	Leu	Leu	Leu	Asn	Leu	Phe	Ile	Ala	Gly	Thr	Asp	Thr		
			260					265					270				
tca	tca	agt	act	gta	gaa	tgg	gcc	atg	gca	gaa	cta	atc	cga	aac	cca	864	
Ser	Ser	Ser	Thr	Val	Glu	Trp	Ala	Met	Ala	Glu	Leu	Ile	Arg	Asn	Pro		
			275				280					285					
aag	tta	cta	gtc	caa	gcc	caa	gaa	gag	cta	gac	aga	gta	gtc	ggg	ccg	912	
Lys	Leu	Leu	Val	Gln	Ala	Gln	Glu	Glu	Leu	Asp	Arg	Val	Val	Gly	Pro		
			290				295				300						
aac	cga	ttc	gta	acc	gaa	tct	gat	ctt	cct	caa	ctg	aca	ttc	ctt	caa	960	
Asn	Arg	Phe	Val	Thr	Glu	Ser	Asp	Leu	Pro	Gln	Leu	Thr	Phe	Leu	Gln		
					310				315						320		
gcc	gtc	atc	aaa	gag	act	ttc	agg	ctt	cat	cca	tcc	acc	cca	ctc	tct	1008	
Ala	Val	Ile	Lys	Glu	Thr	Phe	Arg	Leu	His	Pro	Ser	Thr	Pro	Leu	Ser		
				325					330					335			
ctt	cca	cga	atg	gcg	gcg	gag	gac	tgt	gag	atc	aat	ggg	tat	tat	gtc	1056	
Leu	Pro	Arg	Met	Ala	Ala	Glu	Asp	Cys	Glu	Ile	Asn	Gly	Tyr	Tyr	Val		
				340				345					350				
tca	gaa	ggt	tcg	aca	ttg	ctc	gtc	aat	gtg	tgg	gcc	ata	gct	cgt	gat	1104	
Ser	Glu	Gly	Ser	Thr	Leu	Leu	Val	Asn	Val	Trp	Ala	Ile	Ala	Arg	Asp		
				355			360					365					
cca	aat	gcg	tgg	gcc	aat	cca	cta	gat	ttc	aac	ccg	act	cgt	ttc	ttg	1152	
Pro	Asn	Ala	Trp	Ala	Asn	Pro	Leu	Asp	Phe	Asn	Pro	Thr	Arg	Phe	Leu		
				370			375				380						
gcc	ggt	gga	gag	aag	cct	aat	gtt	gat	gtt	aaa	ggg	aat	gat	ttt	gaa	1200	
Ala	Gly	Gly	Glu	Lys	Pro	Asn	Val	Asp	Val	Lys	Gly	Asn	Asp	Phe	Glu		
					385		390			395					400		

gtg ata cct ttc ggt gct ggg cgc agg ata tgt gcc gga atg agc tta 1248
 Val Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys Ala Gly Met Ser Leu
 405 410 415

ggt ata cgg atg gtt caa cta gta acg gct tcg tta gtt cat tcg ttt 1296
 Gly Ile Arg Met Val Gln Leu Val Thr Ala Ser Leu Val His Ser Phe
 420 425 430

gat tgg gct ttg ttg gat gga ctt aaa ccc gag aag ctt gac atg gag 1344
 Asp Trp Ala Leu Leu Asp Gly Leu Lys Pro Glu Lys Leu Asp Met Glu
 435 440 445

gaa ggt tat gga cta acg ctt caa cga gct tca cct tta atc gtc cat 1392
 Glu Gly Tyr Gly Leu Thr Leu Gln Arg Ala Ser Pro Leu Ile Val His
 450 455 460

cca aag ccg agg ctc tcg gct caa gtt tat tgt atg taa caagtttgtg 1441
 Pro Lys Pro Arg Leu Ser Ala Gln Val Tyr Cys Met
 465 470 475

aagccagtct gatttcagtt ggatttgtag ttattttatg atcatttggt attttatttt 1501

gtatttcggt tgaatacaat aaaggggaagg tggatcgtct gctgtataat agcgacgttt 1561

taacgtgttg tgatagtacc gtgttttact aaaacgatgt cgtttgattt tttatagtat 1621

taaaaaata aacagctgga ttttgaacca aaaaaaaaaa aaaaaa 1667

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 <212> PRT
 <213> Gentian

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 20 25 30
 Gly Leu Lys Asp Ala Val Val Ala Ser Ser Ala Ser Val Ala Glu Gln
 35 40 45
 Phe Leu Lys Lys His Asp Val Asn Phe Ser Asn Arg Pro Pro Asn Ser
 50 55 60
 Gly Ala Lys His Ile Ala Tyr Asn Tyr Gln Asp Leu Val Phe Ala Pro
 65 70 75 80
 Tyr Gly Pro Arg Trp Arg Leu Leu Arg Lys Ile Cys Ser Val His Leu
 85 90 95
 Phe Ser Ser Lys Ala Leu Asp Asp Phe Gln His Val Arg His Glu Glu
 100 105 110
 Ile Cys Ile Leu Ile Arg Ala Ile Ala Ser Gly Gly His Ala Pro Val
 115 120 125
 Asn Leu Gly Lys Leu Leu Gly Val Cys Thr Thr Asn Ala Leu Ala Arg
 130 135 140

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  Arg Ile Leu Thr Arg Ser Ile Ala Ser Ala Gly Glu Asn Pro Ile Asn
    1             5             10             15

tta ggt caa tta ctc ggg gtg tgt acc aca aat gct ctg gcg aga gtg 97
Leu Gly Gln Leu Leu Gly Val Cys Thr Thr Asn Ala Leu Ala Arg Val
    20             25             30

atg ctt gga agg agg gta ttc ggc gat ggg agc ggc ggc gta gat cct 145
Met Leu Gly Arg Arg Val Phe Gly Asp Gly Ser Gly Gly Val Asp Pro
    35             40             45

cag gcg gac gag ttc aaa tcc atg gtg gtg gaa atc atg gtg ttg gcc 193
Gln Ala Asp Glu Phe Lys Ser Met Val Val Glu Ile Met Val Leu Ala
    50             55             60

ggc gcg ttt aat cta ggt gat ttt att ccc gct ctt gat tgg ttc gat 241
Gly Ala Phe Asn Leu Gly Asp Phe Ile Pro Ala Leu Asp Trp Phe Asp
    65             70             75             80

ctg cag gga att acg gca aaa atg aag aaa gtt cac gct cgt ttc gat 289
Leu Gln Gly Ile Thr Ala Lys Met Lys Lys Val His Ala Arg Phe Asp
    85             90             95

gcg ttc tta gac gcg atc ctt gag gag cac aaa tcc aac ggc tct cgc 337
Ala Phe Leu Asp Ala Ile Leu Glu Glu His Lys Ser Asn Gly Ser Arg
    100            105            110

gga gct aag caa cac gtt gac ttg ctg agt atg ttg atc tcc ctt caa 385
Gly Ala Lys Gln His Val Asp Leu Leu Ser Met Leu Ile Ser Leu Gln
    115            120            125

gat aat aac att gat ggt gaa agt ggc gcc aaa ctc act gat aca gaa 433
Asp Asn Asn Ile Asp Gly Glu Ser Gly Ala Lys Leu Thr Asp Thr Glu
    130            135            140

atc aaa gct ttg ctt ctg aac ttg ttc acg gct gga aca gac acg tca 481
Ile Lys Ala Leu Leu Leu Asn Leu Phe Thr Ala Gly Thr Asp Thr Ser
    145            150            155            160

tca agt act gtg gag tgg gca atc gca gag cta atc cga aac cca gaa 529
Ser Ser Thr Val Glu Trp Ala Ile Ala Glu Leu Ile Arg Asn Pro Glu
    165            170            175

gta ttg gtt caa gcc caa caa gag ctc gat aga gta gtt ggg cca agt 577
Val Leu Val Gln Ala Gln Gln Glu Leu Asp Arg Val Val Gly Pro Ser
    180            185            190

cgt ctt gtg acc gaa tct gat ctg cct caa ttg gca ttc ctt caa gct 625
Arg Leu Val Thr Glu Ser Asp Leu Pro Gln Leu Ala Phe Leu Gln Ala
    195            200            205

gtc atc aaa gag act ttc aga ctt cat cca tcc act cca ctc tct ctt 673
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Val	Ile	Lys	Glu	Thr	Phe	Arg	Leu	His	Pro	Ser	Thr	Pro	Leu	Ser	Leu		
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Pro	Arg	Met	Ala	Ser	Glu	Gly	Cys	Glu	Ile	Asn	Gly	Tyr	Ser	Ile	Pro		
225					230					235					240		
aag	ggg	tcg	aca	ttg	ctc	gtt	aac	gta	tgg	tcc	ata	gcc	cgt	gat	cct	769	
Lys	Gly	Ser	Thr	Leu	Leu	Val	Asn	Val	Trp	Ser	Ile	Ala	Arg	Asp	Pro		
				245					250					255			
agt	ata	tgg	gcc	gac	cca	tta	gaa	ttt	agg	ccg	gca	cgt	ttc	ttg	ccc	817	
Ser	Ile	Trp	Ala	Asp	Pro	Leu	Glu	Phe	Arg	Pro	Ala	Arg	Phe	Leu	Pro		
			260					265					270				
ggc	gga	gaa	aag	ccc	aat	gtt	gat	gtg	aga	ggc	aat	gat	ttt	gag	gtc	865	
Gly	Gly	Glu	Lys	Pro	Asn	Val	Asp	Val	Arg	Gly	Asn	Asp	Phe	Glu	Val		
		275					280					285					
ata	cca	ttt	ggg	gct	gga	cgt	agg	ata	tgt	gct	gga	atg	agc	ttg	ggg	913	
Ile	Pro	Phe	Gly	Ala	Gly	Arg	Arg	Ile	Cys	Ala	Gly	Met	Ser	Leu	Gly		
		290				295					300						
tta	aga	atg	gtt	caa	ctt	tcg	aca	gct	act	ttg	gtt	cat	tcg	ttt	aat	961	
Leu	Arg	Met	Val	Gln	Leu	Ser	Thr	Ala	Thr	Leu	Val	His	Ser	Phe	Asn		
305					310					315					320		
tgg	gat	ttg	ctg	aat	ggg	atg	agc	cca	gat	aaa	ctt	gac	atg	gaa	gaa	1009	
Trp	Asp	Leu	Leu	Asn	Gly	Met	Ser	Pro	Asp	Lys	Leu	Asp	Met	Glu	Glu		
				325					330					335			
gct	tat	ggg	ctt	aca	ttg	caa	cgg	gct	tca	cct	ttg	att	gtc	cac	cca	1057	
Ala	Tyr	Gly	Leu	Thr	Leu	Gln	Arg	Ala	Ser	Pro	Leu	Ile	Val	His	Pro		
			340					345					350				
aag	ccc	agg	ctt	gct	agc	tct	atg	tat	gtt	aaa	tga	aattatgctg				1103	
Lys	Pro	Arg	Leu	Ala	Ser	Ser	Met	Tyr	Val	Lys							
		355					360										
tg	cg	aa	ta	at	tc	ct	ta	tt	ta	tt	ta	ta	ta	ta	ta	1163	
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 <212> PRT
 <213> Lisianthus

<400> 25
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 20 25 30

<400> 26

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Met Asp Tyr Val Asn Ile Leu
1 5

ctg gga ctg ttt ttc act tgg ttc ttg gtg aat gga ctc atg tca ctt 103
Leu Gly Leu Phe Phe Thr Trp Phe Leu Val Asn Gly Leu Met Ser Leu
10 15 20

cga aga aga aaa atc tct aag aaa ctt cca cca ggt cca ttt cct ttg 151
Arg Arg Arg Lys Ile Ser Lys Lys Leu Pro Pro Gly Pro Phe Pro Leu
25 30 35

cct atc atc gga aat ctt cac tta ctt ggt aat cat cct cac aaa tca 199
Pro Ile Ile Gly Asn Leu His Leu Leu Gly Asn His Pro His Lys Ser
40 45 50 55

ctt gct caa ctt gca aaa att cat ggt cct att atg aat ctc aaa tta 247
Leu Ala Gln Leu Ala Lys Ile His Gly Pro Ile Met Asn Leu Lys Leu
60 65 70

ggc caa cta aac aca gtg gtc att tca tca tca gtc gtg gca aga gaa 295
Gly Gln Leu Asn Thr Val Val Ile Ser Ser Ser Val Val Ala Arg Glu
75 80 85

gtc ttg caa aaa caa gac tta aca ttt tcc aat agg ttt gtc ccg gac 343
Val Leu Gln Lys Gln Asp Leu Thr Phe Ser Asn Arg Phe Val Pro Asp
90 95 100

gta gtc cat gtc cga aat cac tcc gat ttt tct gtt gtt tgg tta cca 391
Val Val His Val Arg Asn His Ser Asp Phe Ser Val Val Trp Leu Pro
105 110 115

gtc aat tct cga tgg aaa acg ctt cgc aaa atc atg aac tct agc atc 439
Val Asn Ser Arg Trp Lys Thr Leu Arg Lys Ile Met Asn Ser Ser Ile
120 125 130 135

ttt tct ggt aac aag ctt gat ggt aat caa cat ctg agg tct aaa aag 487
Phe Ser Gly Asn Lys Leu Asp Gly Asn Gln His Leu Arg Ser Lys Lys
140 145 150

gtc caa gag tta att gat tat tgt caa aag tgt gcc aag aat ggc gaa 535
Val Gln Glu Leu Ile Asp Tyr Cys Gln Lys Cys Ala Lys Asn Gly Glu
155 160 165

gca gtg gat ata gga aga gca act ttt gga act act ttg aat ttg cta 583
Ala Val Asp Ile Gly Arg Ala Thr Phe Gly Thr Thr Leu Asn Leu Leu
170 175 180

tcc aac acc att ttc tct aaa gat ttg act aat ccg ttt tct gat tct 631
Ser Asn Thr Ile Phe Ser Lys Asp Leu Thr Asn Pro Phe Ser Asp Ser
185 190 195

gct aaa gag ttt aag gaa ttg gtt tgg aac att atg gtt gag gct gga 679

Ala Lys Glu Phe Lys Glu Leu Val Trp Asn Ile Met Val Glu Ala Gly	
200 205 210 215	
aaa ccc aat ttg gtg gac tac ttt cct ttc ctt gag aaa att gat ccg	727
Lys Pro Asn Leu Val Asp Tyr Phe Pro Phe Leu Glu Lys Ile Asp Pro	
220 225 230	
caa ggt ata aag cga cgc atg act aat aat ttt act aag ttt ctt ggc	775
Gln Gly Ile Lys Arg Arg Met Thr Asn Asn Phe Thr Lys Phe Leu Gly	
235 240 245	
ctt atc agc ggt ttg att gat gac cgg tta aag gaa agg aat cta agg	823
Leu Ile Ser Gly Leu Ile Asp Asp Arg Leu Lys Glu Arg Asn Leu Arg	
250 255 260	
gac aat gca aat att gat gtt tta gac gcc ctt ctc aac att agc caa	871
Asp Asn Ala Asn Ile Asp Val Leu Asp Ala Leu Leu Asn Ile Ser Gln	
265 270 275	
gag aac cca gaa gag att gac agg aat caa atc gag cag ttg tgt ctg	919
Glu Asn Pro Glu Glu Ile Asp Arg Asn Gln Ile Glu Gln Leu Cys Leu	
280 285 290 295	
gac ttg ttt gca gca ggg act gat act aca tcg aat acc ttg gag tgg	967
Asp Leu Phe Ala Ala Gly Thr Asp Thr Thr Ser Asn Thr Leu Glu Trp	
300 305 310	
gca atg gca gaa cta ctt cag aat cca cac aca ttg cag aaa gca caa	1015
Ala Met Ala Glu Leu Leu Gln Asn Pro His Thr Leu Gln Lys Ala Gln	
315 320 325	
gaa gaa ctt gca caa gtc att ggt aaa ggc aaa caa gta gaa gaa gca	1063
Glu Glu Leu Ala Gln Val Ile Gly Lys Gly Lys Gln Val Glu Glu Ala	
330 335 340	
gat gtt gga cga cta cct tac ttg cga tgc ata gtg aaa gaa acc tta	1111
Asp Val Gly Arg Leu Pro Tyr Leu Arg Cys Ile Val Lys Glu Thr Leu	
345 350 355	
cga ata cac cca gcg gct cct ctc tta att cca cgt aaa gtg gag gaa	1159
Arg Ile His Pro Ala Ala Pro Leu Leu Ile Pro Arg Lys Val Glu Glu	
360 365 370 375	
gac gtt gag ttg tct acc tat att att cca aag gat tca caa gtt cta	1207
Asp Val Glu Leu Ser Thr Tyr Ile Ile Pro Lys Asp Ser Gln Val Leu	
380 385 390	
gtg aac gta tgg gca att gga cgc aac tct gat cta tgg gaa aat cct	1255
Val Asn Val Trp Ala Ile Gly Arg Asn Ser Asp Leu Trp Glu Asn Pro	
395 400 405	
ttg gtc ttt aag cca gaa agg ttt tgg gag tca gaa ata gat atc cga	1303
Leu Val Phe Lys Pro Glu Arg Phe Trp Glu Ser Glu Ile Asp Ile Arg	
410 415 420	

ggt cga gat ttt gaa ctc att cca ttt ggt gct ggt cga aga att tgc 1351
 Gly Arg Asp Phe Glu Leu Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys
 425 430 435

cct gga ttg cct ttg gct atg agg atg att cca gta gca cta ggt tca 1399
 Pro Gly Leu Pro Leu Ala Met Arg Met Ile Pro Val Ala Leu Gly Ser
 440 445 450 455

ttg cta aac tca ttt aat tgg aaa cta tat ggt gga att gca cct aaa 1447
 Leu Leu Asn Ser Phe Asn Trp Lys Leu Tyr Gly Gly Ile Ala Pro Lys
 460 465 470

gat ttg gac atg cag gaa aag ttt ggc att acc ttg gcg aaa gcc caa 1495
 Asp Leu Asp Met Gln Glu Lys Phe Gly Ile Thr Leu Ala Lys Ala Gln
 475 480 485

cct ctg cta gct atc cca act ccc ctg tag ctatagggat aaattaagtt 1545
 Pro Leu Leu Ala Ile Pro Thr Pro Leu
 490 495

gaggtttttaa gttactagta gattctattg cagctatagg atttctttca ccatcacgta 1605

tgctttaccg ttggatgatg gaaagaaata tctatagctt tgggtttggt tagtttgcac 1665

ataaaaattg aatgaatgga ataccatgga gttataagaa ataataagac tatgattctt 1725

accctacttg aacaatgaca tggctatttc ac 1757

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 Val Asn Gly Leu Met Ser Leu Arg Arg Arg Lys Ile Ser Lys Lys Leu
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 Pro Pro Gly Pro Phe Pro Leu Pro Ile Ile Gly Asn Leu His Leu Leu
 35 40 45
 Gly Asn His Pro His Lys Ser Leu Ala Gln Leu Ala Lys Ile His Gly
 50 55 60
 Pro Ile Met Asn Leu Lys Leu Gly Gln Leu Asn Thr Val Val Ile Ser
 65 70 75 80
 Ser Ser Val Val Ala Arg Glu Val Leu Gln Lys Gln Asp Leu Thr Phe
 85 90 95
 Ser Asn Arg Phe Val Pro Asp Val Val His Val Arg Asn His Ser Asp
 100 105 110
 Phe Ser Val Val Trp Leu Pro Val Asn Ser Arg Trp Lys Thr Leu Arg
 115 120 125
 Lys Ile Met Asn Ser Ser Ile Phe Ser Gly Asn Lys Leu Asp Gly Asn
 130 135 140

Gln	His	Leu	Arg	Ser	Lys	Lys	Val	Gln	Glu	Leu	Ile	Asp	Tyr	Cys	Gln
145					150					155					160
Lys	Cys	Ala	Lys	Asn	Gly	Glu	Ala	Val	Asp	Ile	Gly	Arg	Ala	Thr	Phe
				165					170						175
Gly	Thr	Thr	Leu	Asn	Leu	Leu	Ser	Asn	Thr	Ile	Phe	Ser	Lys	Asp	Leu
			180					185					190		
Thr	Asn	Pro	Phe	Ser	Asp	Ser	Ala	Lys	Glu	Phe	Lys	Glu	Leu	Val	Trp
		195					200					205			
Asn	Ile	Met	Val	Glu	Ala	Gly	Lys	Pro	Asn	Leu	Val	Asp	Tyr	Phe	Pro
	210					215					220				
Phe	Leu	Glu	Lys	Ile	Asp	Pro	Gln	Gly	Ile	Lys	Arg	Arg	Met	Thr	Asn
225					230					235					240
Asn	Phe	Thr	Lys	Phe	Leu	Gly	Leu	Ile	Ser	Gly	Leu	Ile	Asp	Asp	Arg
				245					250					255	
Leu	Lys	Glu	Arg	Asn	Leu	Arg	Asp	Asn	Ala	Asn	Ile	Asp	Val	Leu	Asp
			260					265					270		
Ala	Leu	Leu	Asn	Ile	Ser	Gln	Glu	Asn	Pro	Glu	Glu	Ile	Asp	Arg	Asn
	275						280					285			
Gln	Ile	Glu	Gln	Leu	Cys	Leu	Asp	Leu	Phe	Ala	Ala	Gly	Thr	Asp	Thr
	290					295					300				
Thr	Ser	Asn	Thr	Leu	Glu	Trp	Ala	Met	Ala	Glu	Leu	Leu	Gln	Asn	Pro
305					310					315					320
His	Thr	Leu	Gln	Lys	Ala	Gln	Glu	Glu	Leu	Ala	Gln	Val	Ile	Gly	Lys
				325					330					335	
Gly	Lys	Gln	Val	Glu	Glu	Ala	Asp	Val	Gly	Arg	Leu	Pro	Tyr	Leu	Arg
			340					345					350		
Cys	Ile	Val	Lys	Glu	Thr	Leu	Arg	Ile	His	Pro	Ala	Ala	Pro	Leu	Leu
	355						360				365				
Ile	Pro	Arg	Lys	Val	Glu	Glu	Asp	Val	Glu	Leu	Ser	Thr	Tyr	Ile	Ile
	370					375					380				
Pro	Lys	Asp	Ser	Gln	Val	Leu	Val	Asn	Val	Trp	Ala	Ile	Gly	Arg	Asn
385				390						395					400
Ser	Asp	Leu	Trp	Glu	Asn	Pro	Leu	Val	Phe	Lys	Pro	Glu	Arg	Phe	Trp
				405					410					415	
Glu	Ser	Glu	Ile	Asp	Ile	Arg	Gly	Arg	Asp	Phe	Glu	Leu	Ile	Pro	Phe
			420					425					430		
Gly	Ala	Gly	Arg	Arg	Ile	Cys	Pro	Gly	Leu	Pro	Leu	Ala	Met	Arg	Met
	435						440					445			
Ile	Pro	Val	Ala	Leu	Gly	Ser	Leu	Leu	Asn	Ser	Phe	Asn	Trp	Lys	Leu
	450					455					460				
Tyr	Gly	Gly	Ile	Ala	Pro	Lys	Asp	Leu	Asp	Met	Gln	Glu	Lys	Phe	Gly
465					470					475					480
Ile	Thr	Leu	Ala	Lys	Ala	Gln	Pro	Leu	Leu	Ala	Ile	Pro	Thr	Pro	Leu
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<220>

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<400> 28
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<220>
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<220>
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20

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<400> 33
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<210> 34
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<400> 34
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<210> 35
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<400> 35

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32

<210> 36

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<212> PRT

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<210> 37

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<210> 38
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<400> 38
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<400> 39
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<400> 40
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<210> 41
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